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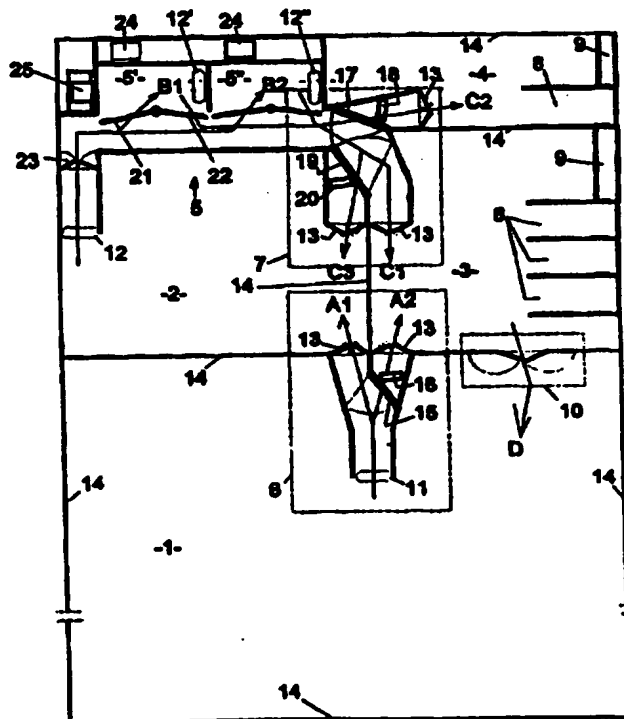
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Published*With international search report.**Before the expiration of the time limit for amending the claims and to be republished in the event of the receipt of amendments.**In English translation (filed in Dutch).***(54) Title: DEVICE AND METHOD FOR AUTOMATICALLY MILKING OF ANIMALS****(57) Abstract**

Device and method for automatic milking of animals, which device comprises inter alia one or more milking stalls (5', 5'') provided with an entrance gate (21) and an exit gate (22), a lying and walking area (1), a feeding and watering area (3), and an access sluice (6) which is provided with a first identification system (11) which is coupled to a control system (25) for controlling the device, which access sluice (6) can alternately clear a passage for an animal from the walking area (1) to a milking stall (5', 5'') or to the feeding and watering space (3), wherein a waiting area (2) is incorporated between the access sluice (6) and the entrance gate (21), whereby cows which do not require milking or which cannot be admitted to the milking device always have free access to food or drink and wherein the cows for milking do not become disturbed during the wait for access to the milking stall.



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Device and method for automatically milking of animals

The invention relates to a device for automatic milking of animals, comprising inter alia one or more milking stalls provided with an entrance gate and an exit gate, a lying and walking area, a feeding and watering area, and an access sluice which is provided with a first identification system coupled to a control system for controlling the device, which access sluice can alternat-

5 ingly clear a passage for an animal from the walking area to a milking stall or to the feeding and watering space.

10 Such devices are known inter alia from DE 3702465 in which a device is described wherein cows on the way from a walking stall to a feeding and drinking location are guided past a milking stall with an automatic milking device. The drawback of the known devices is that the

15 limited capacity of the milking system limits the access to the feeding and drinking location, whereby cows which have left this feeding and drinking location can return to this area only after a long wait. These animals hereby become unsettled and cannot eat and drink sufficiently,

20 whereby the supply of milk is adversely affected.

The object of the invention is to provide a device wherein cows which do not require milking or which cannot yet be admitted to the milking device always have free access to food or drink and wherein the cows for milking

25 do not become disturbed during the wait for access to the milking stall.

The invention relates to a milking device wherein a waiting area is incorporated between the access sluice and the entrance gate.

30 By arranging a separate waiting area in front of the milking stall the animals waiting for milking can be segregated, whereby the access sluice is not blocked by waiting animals and the access to the feeding and watering space is not obstructed by waiting animals. Animals

35 waiting to be milked are not disturbed by animals going to the feeding and watering space.

The invention also relates to a method for automatic milking of animals which under the influence of a control system are guided via an access sluice to one of the milking stalls provided with an automatic milking device, wherein the animals are identified as milk-ripe animals by a first identification system placed in the access sluice.

Such a method is known from the above stated DE 3702465, wherein it is expected that after the entrance to the milking stall has been opened the animals will walk directly to a milking stall of which the entrance gate has been opened.

A drawback to the known method is that it is always necessary to wait until the identified animal is in the milking stall and the stall is closed before the following animal can be admitted into the other milking stall. This is necessary since otherwise it is not certain which animal is being milked in which stall. It would then not be possible to record the milking data in the control system. This wait-time reduces the capacity of the device.

The invention has for its object to obviate this drawback in that before leaving the milking stall the animals are identified by a second identification system and the milking data recorded in the control system.

It is hereby possible for more than one animal to be present between the access sluice and the milking stall, while the correct milking data associated with an animal is nevertheless always recorded in the control system.

The invention is elucidated hereinbelow on the basis of a description of an embodiment of a milking installation with which a herd of cows is milked automatically and with reference to a figure.

Shown in the figure is a schematic overview of the diverse areas in which a herd of free-ranging cows provided with identification means is accommodated during the day. The herd, which may consist of several dozen to more than 100 cows, normally occupies a lying and walking area 1 which communicates by means of an access sluice 6 provided with an identification system 11 with a waiting

area 2 and a feeding and watering space 3. A swivel gate 15 operated with an air cylinder 16 is incorporated in the access sluice.

The waiting area 2 joins onto a milking parlour 5 which is connected via an exit fence 7 to a segregation area 4, the feeding and watering space 3 and the waiting area 2. The size of waiting area 2 depends on the capacity of milking parlour 5 and the number of animals in the herd. It is conceivable that the waiting area 2 takes such a large form that the wait-time for the cows in waiting area 2 can amount to a maximum of one hour.

Incorporated in the exit fence 7 is a swing gate 17 operated by an air cylinder 18 in addition to a swing gate 19 operated by an air cylinder 20.

The swing gates 15, 17 and 19 can of course also be operated in different manner, and there are for instance electrically controlled actuators instead of air cylinders 16, 18 and 20.

The feeding and watering space 3 is connected via an exit fence 10 to the lying and walking area 1. The diverse spaces are separated from each other and from the surrounding area by a fence 14. Openings (not shown) can be made by hand in this fence by the operator, as is necessary for instance when the operator leads cows out of the segregation area 4 to other areas, such as for instance the milking parlour 5. In the lying and walking area 1, the segregation area 4 and the feeding and watering space 3 can be placed cubicles (not shown) in which the cows can rest.

Both the access sluice 6 and the exit fence 7 are provided at each exit with a one-directional gate 13 so that cows cannot walk back. Such one-directional gates can for instance fall back into the closed position due to the force of gravity, although it is also possible for them to be carried into the closed position with a spring on each swinging part. The dimensions of the passageways are also such that the animals cannot turn round in the various passageways.

Arranged in milking parlour 5 is a milking stall 5' and a milking stall 5" which are both provided with a

milking installation (not shown) including teat cups which are arranged round the teats of the cow for milking. Each milking stall 5' or 5" is provided with an entrance gate 21 and an exit gate 22. A placing robot 24
5 can couple the teat cups to the teats of the cow in both milking parlours 5' and 5". Access to milking stalls 5' and 5" from the waiting area 2 proceeds via the identification system 12 and the entrance gate 23.

10 In another embodiment an identification system 12' or 12" is arranged in each milking stall 5' or 5" instead of the identification system 12 at the entrance to the milking parlour 5.

A feeding stall 8 and a drinking trough 9 are placed in both the segregation area 4 and in the feeding and
15 watering area 3. The feeding stall 8 is suitable for providing feed concentrate to the cows and is provided for this purpose with an identification system so that each individual cow receives the dosage to which it is entitled. Optionally there are also feeding stalls where
20 bulk fodder is supplied to the cows.

From the feeding and watering area 3 the cow can return to the lying and walking area 1 via an exit gate 10. This exit gate 10 is embodied such that the exit gate 10 is always open in the direction toward the lying and
25 walking area 1. Exit gate 10 can however also be adjusted to open in both directions.

The device is controlled by a control system 25 which is coupled to the diverse identification systems, the diverse gates, the placing robot 24 and the milking
30 installation. The operation of the device is as follows:

From the moment that milking time begins the exit gate 10 is adjusted, for instance by control means present in the gate and controlled by control system 25, such that the cows can only walk in a direction D through exit
35 gate 10.

Any cow which wishes to eat or drink will now be able to pass only via the access sluice 6 to the feeding and watering area 3. The cow is identified in access sluice 6 by the identification system 11 and guided in a
40 direction A1 if it must be milked. Cows which have al-

ready been milked or which are dry are guided in a direction A2 and thus have direct access to the drinking trough 9 or the feeding stall 8.

Cows in the waiting area 2 will proceed toward the milking parlour 5, pass through the identification system 12 and wait in front of the entrance gate 23. Identification may optionally take place in milking stall 5' or 5". If milking stall 5' (optionally 5") is available, exit gate 22 then closes and entrance gate 21 and entrance gate 23 open. The cow now walks in a direction B1 (optionally B2), gate 21 closes and the placing robot 24 places the teat cups round the teats and milking begins.

During the stay in milking stall 5' (or 5"), three situations may occur: In the most frequently occurring situation the cow is milked normally and will leave milking stall 5' in a direction C1 after opening of exit gate 22. Should it be established during milking that the cow requires particular attention, for example if a mastitis infection is detected or in the case the operator has entered into the control beforehand that the cow must be segregated, the cow will then leave milking stall 5' in a direction C2. Should it be found that connection of the teat cups round the teats has not been successful, for instance if connection has not succeeded after 3 to 5 attempts or after a period of 3 minutes, the cow is then guided in a direction C3, whereafter it can re-enter milking parlour 5 after a time.

It is possible that the waiting area 2 is so full of cows that there is only room for animals which come out of milking parlour 5 via direction C3. An additional entrance gate can then be placed in access sluice 6, whereby milk-ripe animals are not admitted into waiting area 2 and remain in the lying and walking area 1. An alternative in this situation is to guide all animals arriving at the access sluice 6 in the direction A2 to the feeding and watering area 3 and by means of the control 25 to prevent the animals being supplied with feed in feeding stall 8. After a time they will then return to access sluice 6 and can then be admitted into waiting area 2.

It has been found in practice that it is important to stimulate the animals and to urge them for instance with coercive means out of walking area 1 to milking parlour 5. These coercive means (not shown) may consist
5 for instance of movable fences on which inter alia electrical stimulating means are arranged.

CLAIMS

1. Device for automatic milking of animals, comprising inter alia one or more milking stalls (5',5") provided with an entrance gate (21) and an exit gate (22), a lying and walking area (1), a feeding and watering area (3), and an access sluice (6) which is provided with a first identification system (11) which is coupled to a control system (25) for controlling the device, which access sluice (6) can alternately clear a passage for an animal from the walking area (1) to a milking stall (5',5") or to the feeding and watering space (3), characterized in that a waiting area (2) is incorporated between the access sluice (6) and the entrance gate (21).

2. Device for automatic milking of animals as claimed in claim 1, characterized in that a second identification system (12;12',12'') coupled to the control system (25) is placed between the waiting area (2) and the exit gate (22).

3. Device for automatic milking of animals as claimed in claim 1 or 2, characterized in that a separating device (7) can connect the exit of the milking stall (5',5") to the waiting area (2).

4. Method for automatic milking of animals which under the influence of a control system (25) are guided via an access sluice (6) to one of the milking stalls (5',5") provided with an automatic milking device, wherein the animals are identified as milk-ripe animals by a first identification system (11) placed in the access sluice (6), characterized in that before leaving the milking stall (5',5") the animals are identified by a second identification system (12;12',12'') and the milking data is recorded in the control system (25).

5. Method for automatic milking of animals as claimed in claim 4, characterized in that an animal admitted for the first time into the milking stall (5',5"), wherein connection of the automatic milking device has failed repeatedly, is guided back to a waiting area

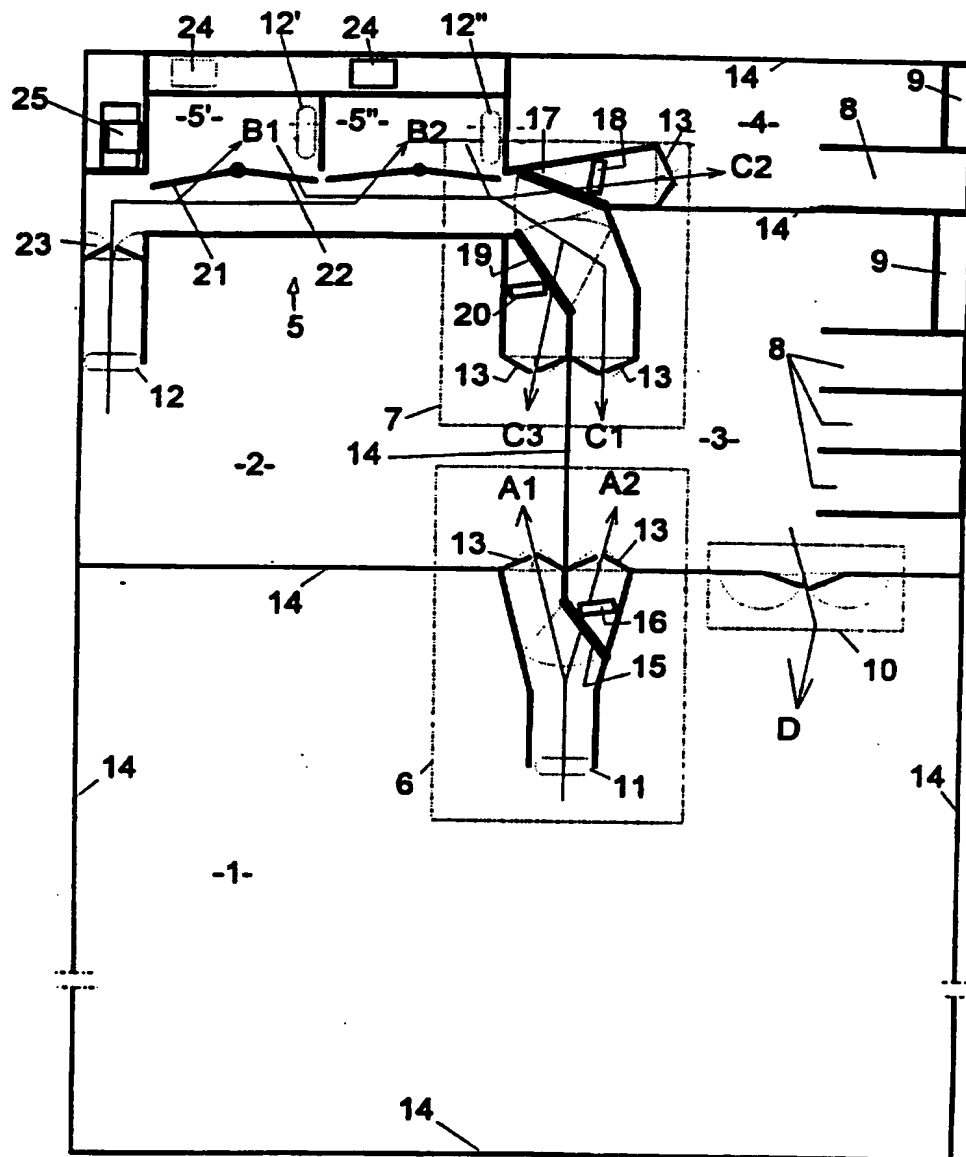
(2) placed between the access sluice (6) and the milking stall (5',5").

6. Method for automatic milking of animals as claimed in claim 5, characterized in that an animal
5 admitted a number of times into the milking stall (5',-5"), wherein connection of the automatic milking device has not resulted in the expected supply of milk, is guided to a segregation area (4).

7. Method for automatic milking of animals as
10 claimed in either of the claims 5 or 6, wherein after successful milking the animals are guided to a feeding and watering area (3), characterized in that in the access sluice (6) the animals are guided to the feeding and watering area (3) when a preset number of animals
15 occupying the waiting area (2) would be exceeded.

8. Method for automatic milking of animals as claimed in any of the claims 4-7, wherein animals are guided to a feeding and watering area (3) and can be fed
20 in a feeding stall (8) placed therein, characterized in that in these feeding stalls (8) feed is only supplied to animals after they have visited the milking stall (5',-5").

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INTERNATIONAL SEARCH REPORT

Int'l Application No

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A. CLASSIFICATION OF SUBJECT MATTER
IPC 6 A01J5/017 A01K1/12 A01K11/00

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 6 A01J A01K

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	DE,A,37 02 465 (DUVELSDORF & SOHN) 11 August 1988 cited in the application see claims; figures ---	1,4
A	NL,A,8 903 163 (GASCOIGNE-MELOTTÉ) 16 July 1991 see claims; figures	1,4
A	& DATABASE WPI Section PQ, Week 9131 Derwent Publications Ltd., London, GB; Class P14, AN 91-228403 & NL,A,8 903 163 (GASCOIGNE-MELOTTÉ) see abstract ---	1,4
A	EP,A,0 551 956 (VAN DER LELY) 21 July 1993 see column 1, line 31 - line 43 see column 2, line 50 - column 3, line 34 -----	1,4

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☒ Patent family members are listed in annex.

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